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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/921,555	08/06/2001	Takeji Ueda	212284US3	7054
22850	7590	03/31/2004	EXAMINER	
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			KORNAKOV, MICHAIL	
			ART UNIT	PAPER NUMBER
			1746	
DATE MAILED: 03/31/2004				

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

09/921,555

**Applicant(s)**

UEDA ET AL.

**Examiner**

Michael Kornakov

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 03 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-6 and 12-17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6 and 12-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114.

Applicant's submission filed on 03/01/2004 has been entered.

### ***Specification***

2. Applicant is reminded of the proper format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

Correction of the instant abstract is required in reply to this Office Action.

### ***Claim Objections***

3. Claims 2-5 are objected to because of the following informalities: Claim 4 recites "a chemical employed in said chemical processing step; and said chemical is one having such a high viscosity...as tending to allow said desired

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liquid to remain on said surface of said substrate...". Claim 5 recites "a chemical employed in said chemical processing step; and said chemical is a solution of at least one of amines and ammonium fluoride...". Apparently, the recited in these claims term "a chemical" and previously recited term "desired liquid" are both used to characterize the same compound. Besides, claims 2-5 appear to be a literal translation into English from a foreign document. For better understanding, Applicants are encouraged to clarify the issues and simplify the claim language.

***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-5 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

- The recited in Claim 1 "...supplying a fresh liquid of the same kind as said desired liquid..." constitutes an indefinite subject matter, because it is not clear which liquid can be characterized as "liquid of the **same** kind" and what term "the same" stands for. The instant disclosure does not provide any clear definition of this term. For examination purposes it is assumed that treatment with a fresh "desired liquid" is indicated.

- The recited in claim 3 "an initial stage" constitutes an indefinite subject matter, because it is not clear what is considered as "initial stage" and the definition of "initial stage" is not provided. For examination purposes it is

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assumed that the stage of processing the substrate with "desired liquid" during its fabrication is recited.

- Claim 2, which depends on claim 1; and claim 4, which depends on claim 3 (which also depends on claim 1) recite treatment "to allow said desired liquid to **remain** on said surface of said substrate". However, claim 1 recites treatment with "said desired liquid while **avoiding such a situation that flow of said desired liquid stagnates** on said surface of said substrate". Therefore, it is not clear, whether the desired liquid remains (stagnates) on the surface of the substrate during treatment or such situation is avoided. Clarification is required.
- Claim 5 is rejected because of its dependency and failure to remove the ambiguity of parent claims.

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).
9. Claims 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Handbook of Semiconductor Wafer Cleaning Technology edited by W. Kern, 1993, pp 3, 137-141 (further referred to as Handbook) and in view of W. Kern, J. Electrochem. Soc., vol. 137, No.6, 1990, p. 1890 (further referred as Journal).

Handbook describes wet treatment of semiconductor wafers, which includes treatment of wafers in a spray processor, wherein wafers are treated with reagent solutions while being disposed and rotated in a horizontal plane perpendicular to the axis of rotation, located outside of said wafers and wherein pressurized spray of reagent solutions is directed uniformly through the stationary spray post at the wafers.

While teaching the uniform direction of reagent solution, Handbook does not specifically indicate that such direction is only perpendicular to the axis. It is

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noticed here, that the claimed direction is parallel to wafer surfaces. Handbook indicates that the high pressure spray, produced by spray processor, helps to physically remove contaminants.

Journal teaches that shear forces, produced by high pressure cleaning fluid jets of DI water or organic solvents which **sweep over** (or directed parallel) the wafer surface, effectively dislodge submicron particles and penetrate into dense topography (page 1890, 4-th paragraph). Therefore, one skilled in the art, motivated by the teaching of Journal, would have found obvious to affect the wafer surfaces with shear forces of cleaning fluid, sweeping over such surfaces, in order to effectively clean wafers in the teaching of Handbook and thus to arrive at the limitation as instantly claimed.

10. Claims 1-6, 13-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Handbook in view of Journal and in further view of GB 2154434.

The combined teaching of Handbook and Journal provides for the entire cleaning sequence, including all rinses ~~etc.~~, and indicates that fresh chemicals always contact the wafer, while spent chemicals are drained continuously (Handbook, page 139). Therefore, the limitations, which recite treatment of wafers "while supplying a fresh liquid of the same kind at a flow rate at least equal to a discharge rate of said desired liquid" and "avoiding of such a situation that a flow of said desired liquid stagnates on said surface of said substrate" is inherently met by the Handbook.

While indicating the supply of reagent solutions to the wafers under rotation, thus inherently providing for centrifugal force, which affects the distribution of said reagents over the wafer surfaces, the combined teaching of Handbook and Journal does not specifically indicate that the provided centrifugal force is greater than gravitation. However, the combined teaching of Handbook and Journal indicates importance of penetration of cleaning liquids into dense topography in order to effectuate the thorough wafer cleaning.

G8'434 discloses cleaning of circuit board surfaces and indicates that better washing of small bores is achieved as a result of the rotating movement of the cleaning liquid, wherein the cleaning liquid, sprayed upon the surfaces to be cleaned, is washed at considerably higher speed of flow over the surfaces than is the case of static arrangement (reads on "gravitation, as instantly claimed), and wherein upon increase of the rotation speed the centrifugal effect predominates more and more and cleaning liquid flows at great force radially outwards over the surfaces. Turbulences and oscillations produced by such movement result in better washing of the small bores (page 1, lines 71-77; paragraph, bridging pages 2 and 3).

Therefore, one skilled in the art motivated by combined teaching of Handbook and Journal and disclosure of GB'434 would have found obvious to apply centrifugal force to the reagent solutions, which is greater than gravitation in order to effectively clean the dense topography in the teaching of Handbook and Journal with the reasonable expectation of success.



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In specific regard to the limitation of claim 3, which is concerned with conducting the sub-step in an initial stage of chemical processing, since the definition of "an initial stage" is not provided by the instant disclosure, and Handbook teaches importance of wafers cleaning at different stages of their processing (Handbook, page 3), the recited limitation is met by applied references.

In specific regard to claim 5, which discloses a water containing organic solvent, it is noticed here that content of water in such solvent is not recited and such limitation is met by combined teaching of Handbook and Journal, indicating the use of organic solvents, since any organic solvent comprises at least traces of water.

In specific regard to claim 14, it would have been found obvious by skilled artisan to supply reagent solutions to the wafer surface in the teaching of Handbook, Journal and JB'434 at the rate at least equal to the rate of removal of the liquid from the wafer in order to maintain the constant presence of the reagent solution on the wafer surface, thus avoiding additional contamination of such surface during processing.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Kornakov whose telephone number is (571) 272-1303. The examiner can normally be reached on 9:00am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski can be reached on (571) 272-1302.

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The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*M. Kornakov*  
*3/26/04*

Michael Kornakov  
Examiner  
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